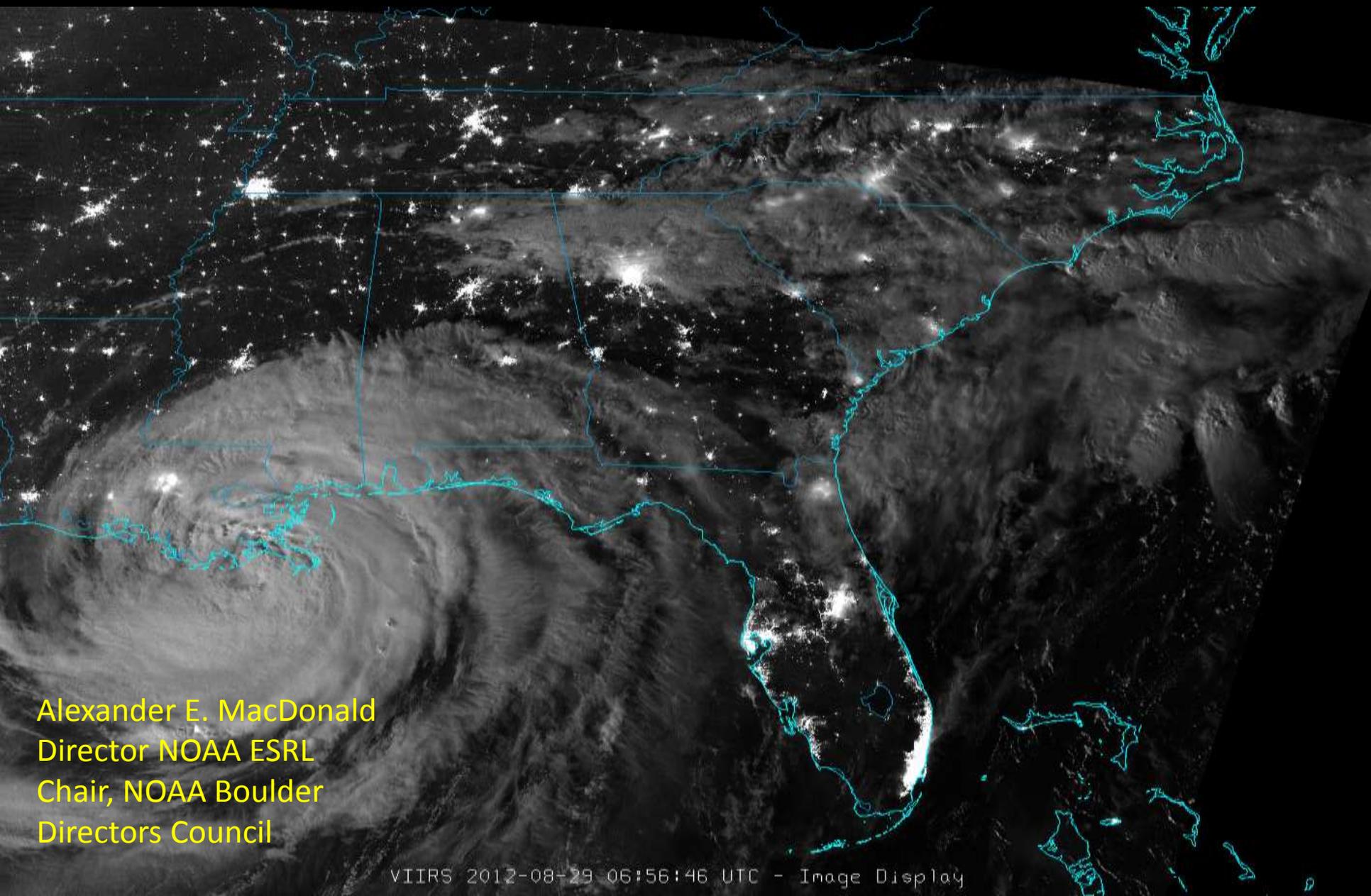


NOAA Boulder: A Leader in Environmental Intelligence



Alexander E. MacDonald
Director NOAA ESRL
Chair, NOAA Boulder
Directors Council

What is Environmental Intelligence?

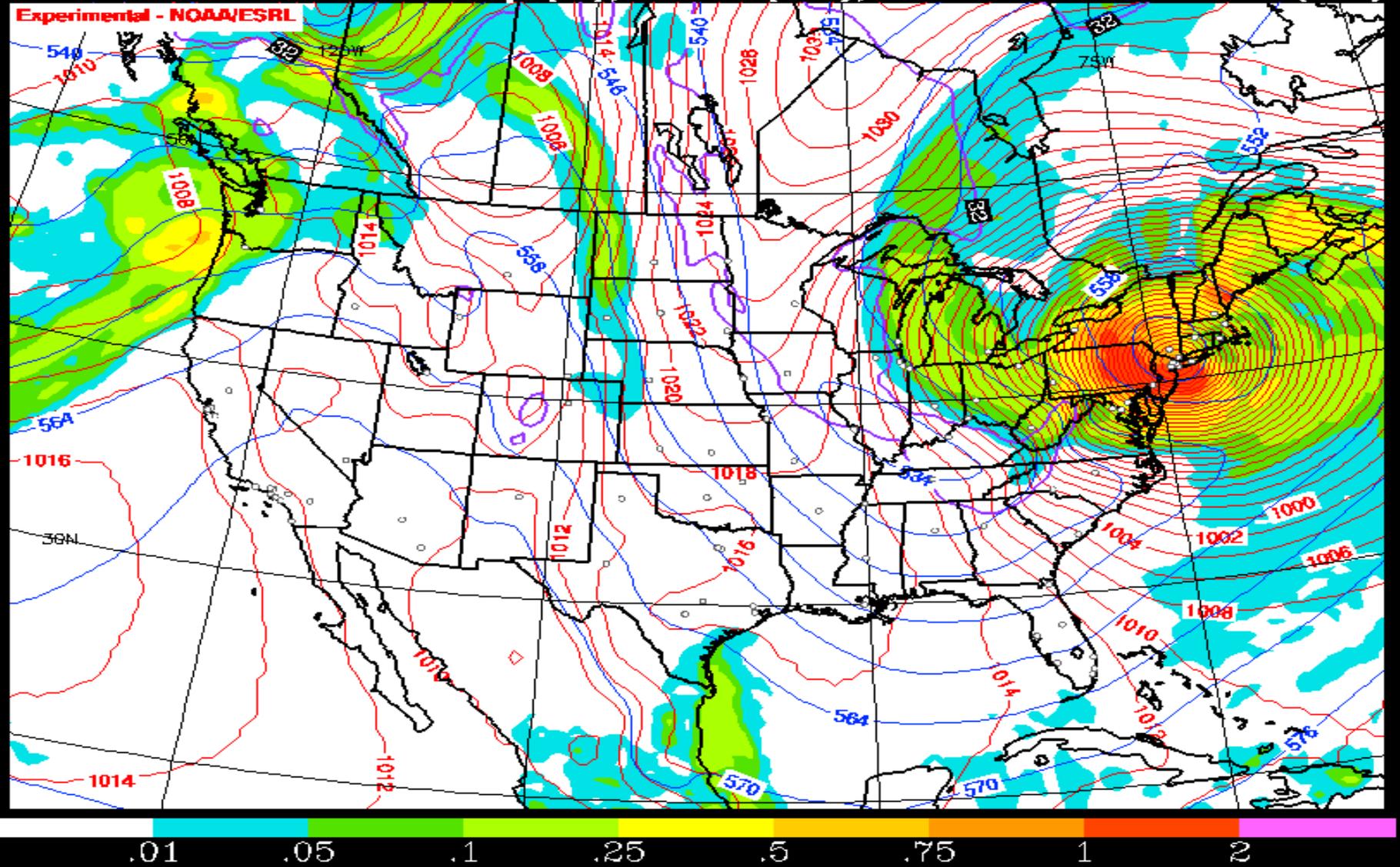
“Timely, actionable information, developed from reliable and authoritative science.”

Kathryn D. Sullivan, NOAA Administrator



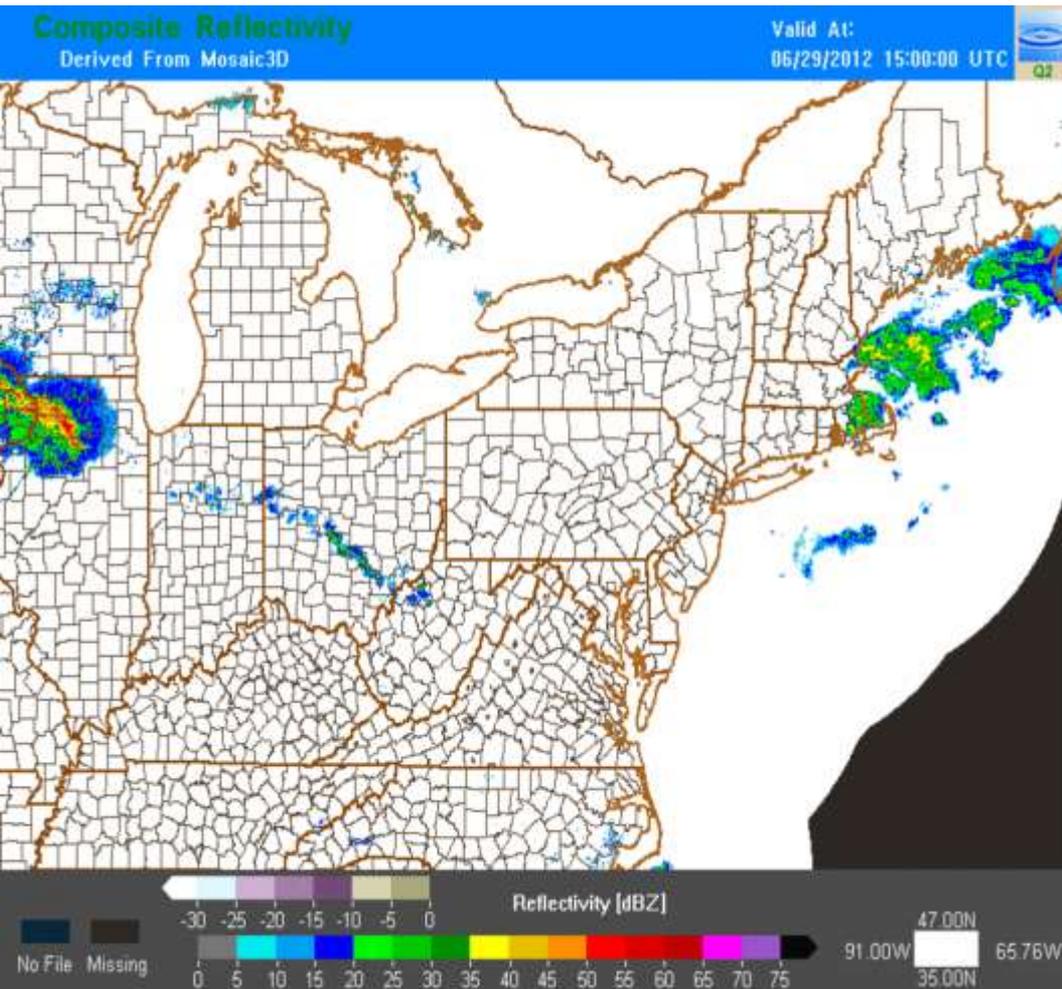
Breezy Point New York, morning after Hurricane Sandy. No fatalities.

6h Acc Precip (in), MSLP (mb), 1000-500 Thickness (dm)

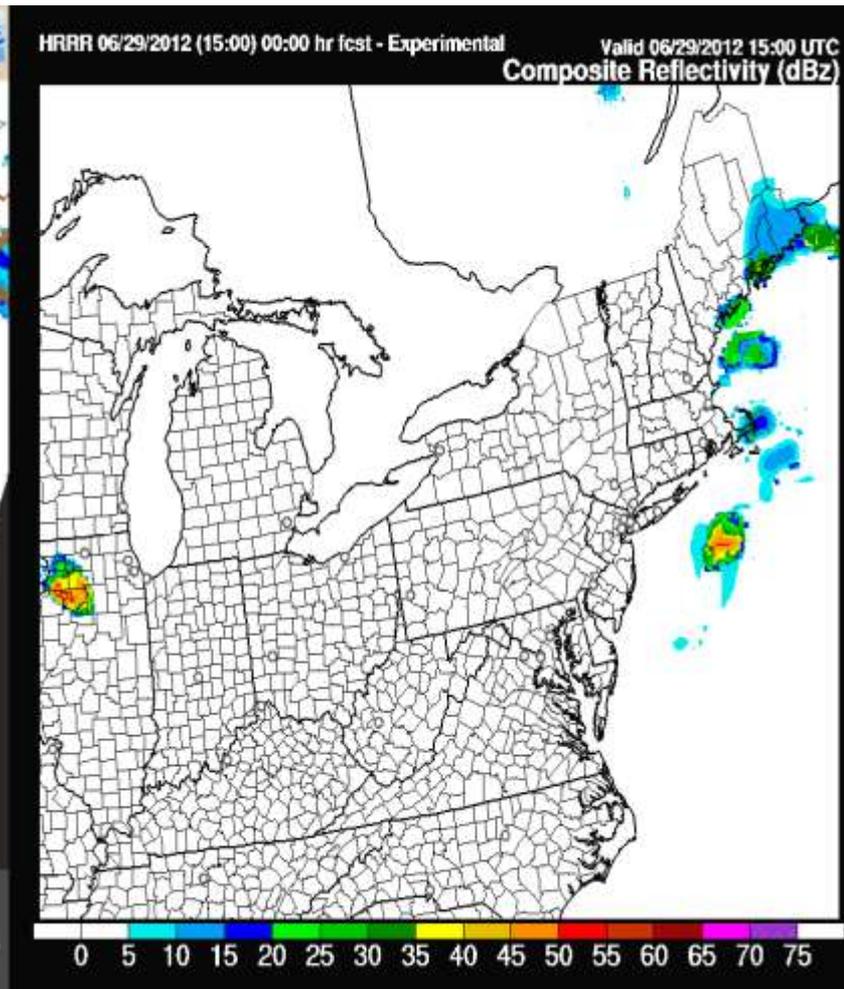


Wednesday, October 24: ESRL's FIM predicts 948 mb low into northern New Jersey.

Observed Radar



Model Prediction





NOAA Boulder



OAR

Earth System Research Laboratory

Alexander E. MacDonald
 OAR Chief Science Advisor/
 ESRL Director

Global
 Monitoring
 Division
 James Butler
 Director

Physical
 Sciences
 Division
 Robin Webb
 Director

Chemical
 Sciences
 Division
 David Fahey
 Acting Director

Global
 Systems
 Division
 Kevin Kelleher
 Director

575 FTEs

NESDIS

NGDC
 Eric A. Kihn
 Acting Director

89 FTEs

NCDC
 David Anderson
 Director/Chief

8 FTEs

NWS

WFO
 Nezette Rydell
 MIC

27 FTEs

SWPC
 Brent Gordon
 Acting Director

65 FTEs

NOS

National Geodetic Survey

4 FTEs

Corporate Services

Christopher Sigle
 Branch Chief

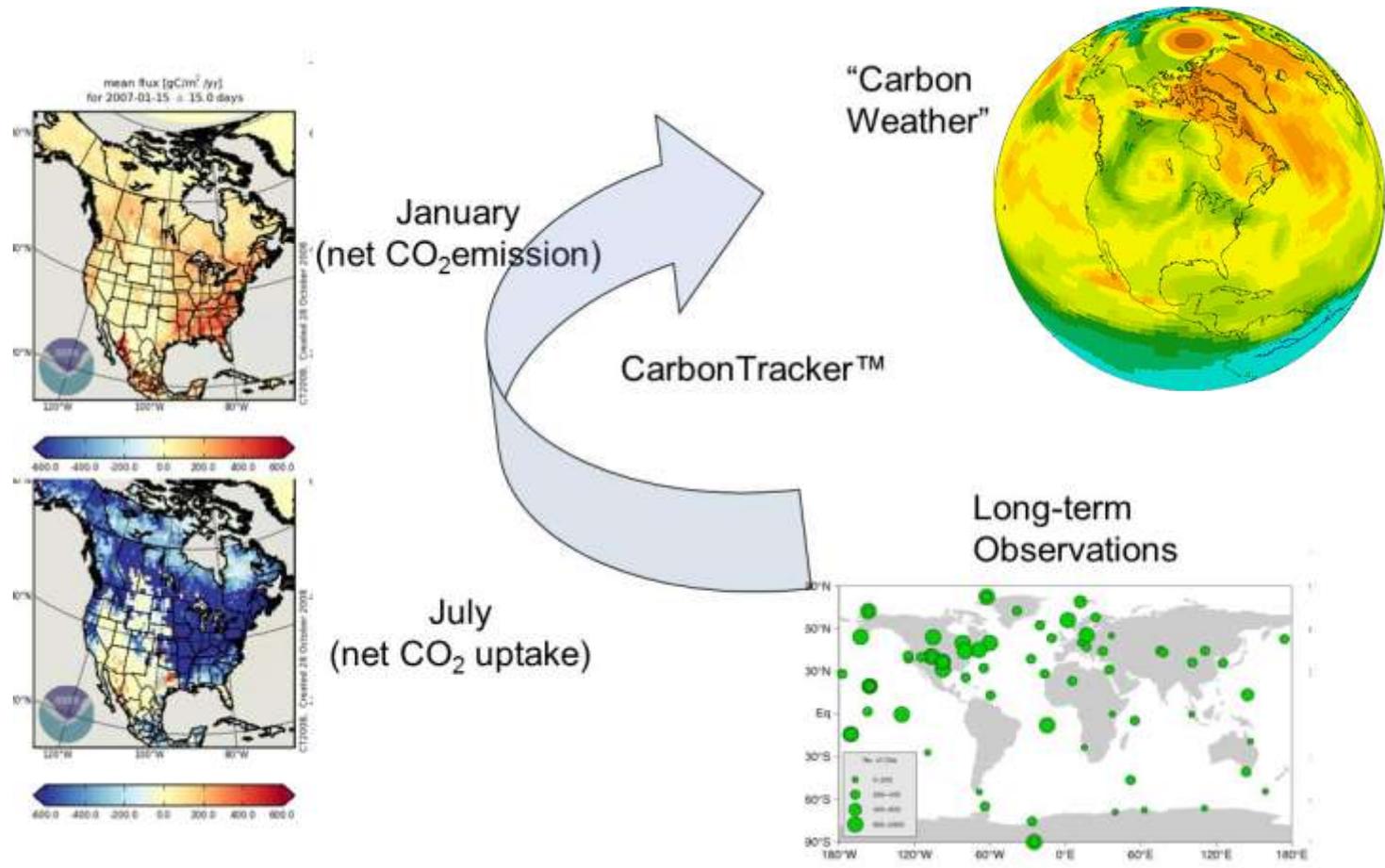
59 FTEs

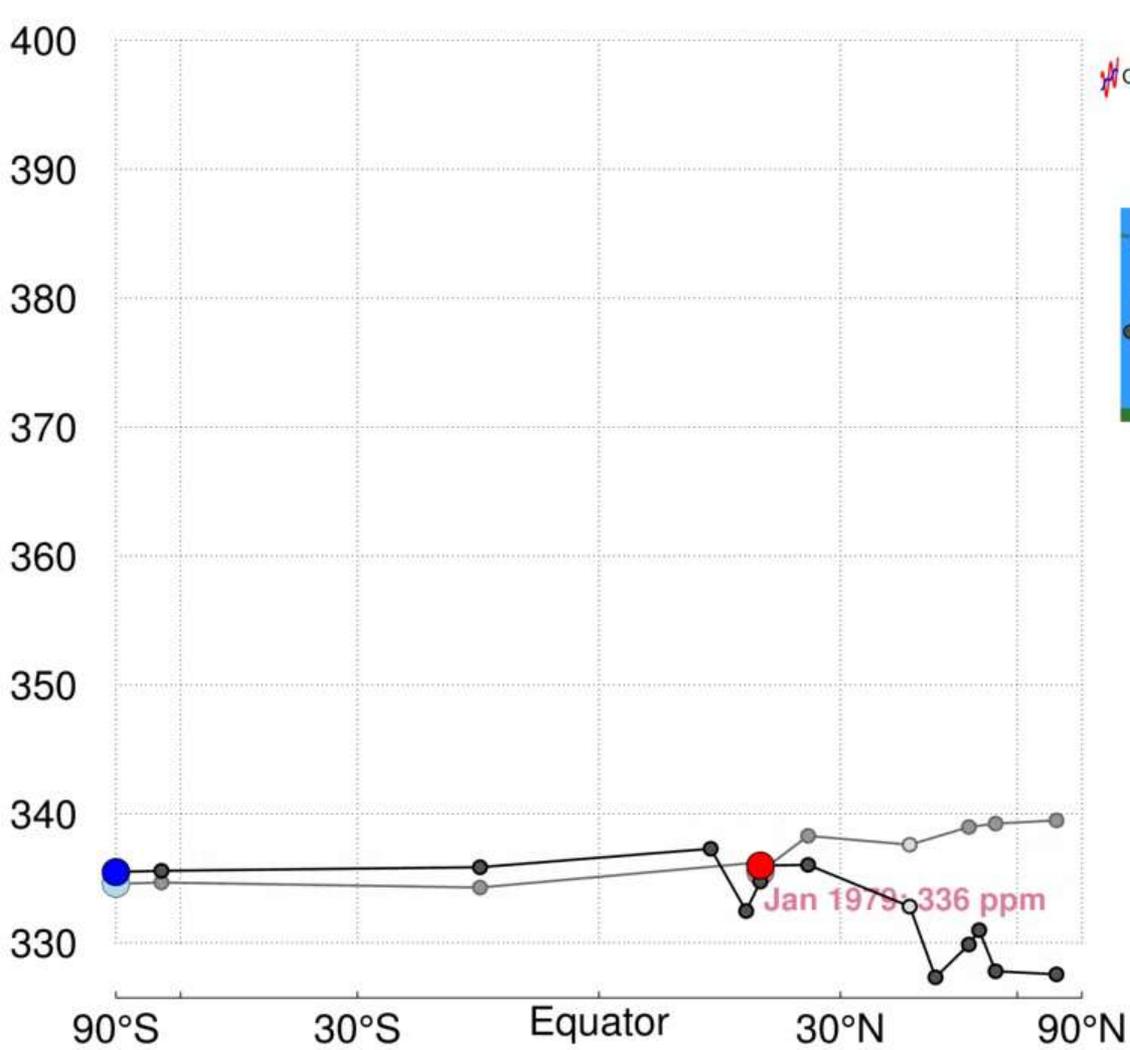


Observations, Research, and Decision Support

James Butler

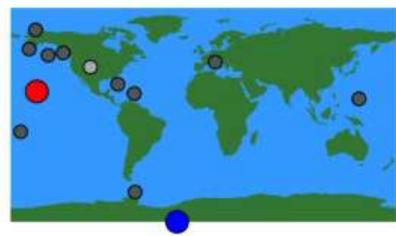
NOAA/ESRL Global Monitoring Division





Atmospheric CO₂ (ppm)

GLOBALVIEW-CO₂ (1979-2012); <http://www.esrl.noaa.gov/gmd/ccgg/globalview/>
 ● Mauna Loa ● South Pole ● Background conditions ○ Local signals
 Contact: andy.jacobson@noaa.gov



1979



1979 1981 1983 1985

400
390
380
370
360
350
340
330

2013 Las Vegas Ozone Study (LVOS)



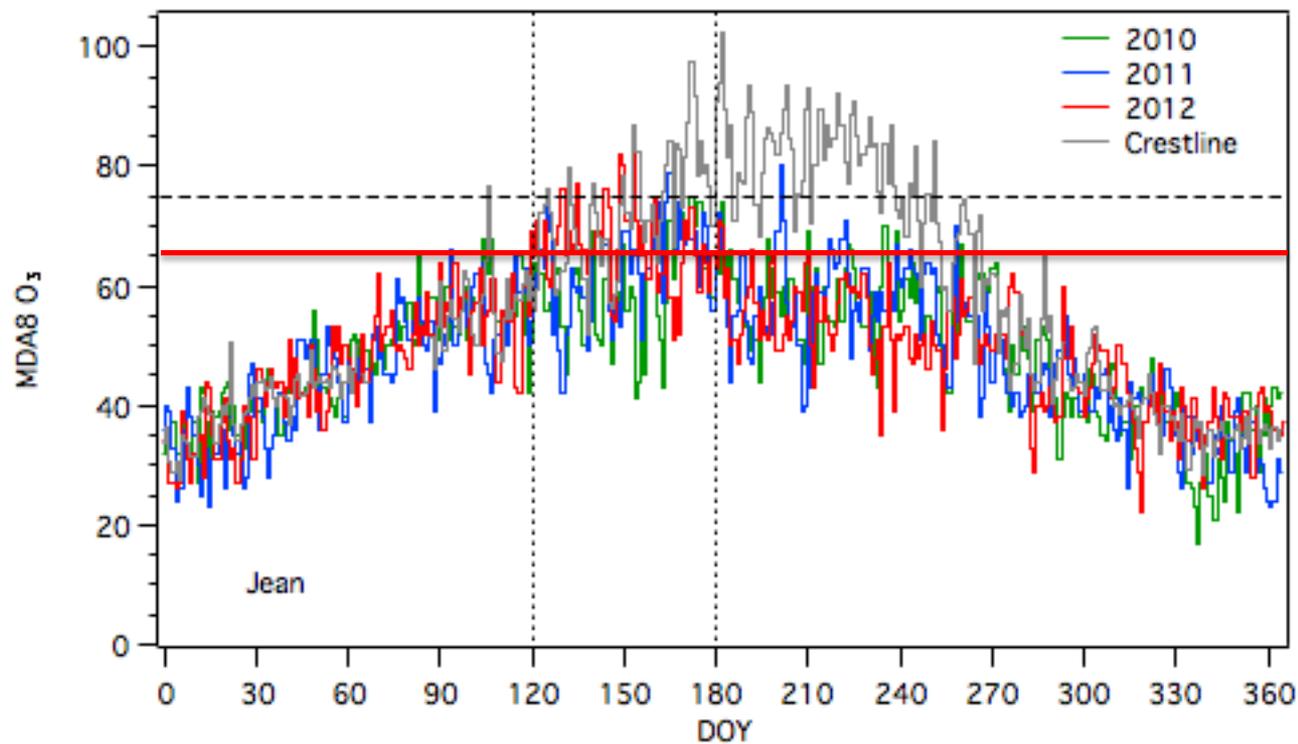
NOAA ESRL Chemical Sciences Division, Boulder, CO
Eric Williams, Deputy Director for Planning

“Please come help us understand our ozone exceedances.”
From the Clark County Department of Air Quality, Zheng Li

Las Vegas, NV

Looking east from Angel Peak, Nevada

Surface ozone in Clark County Nevada



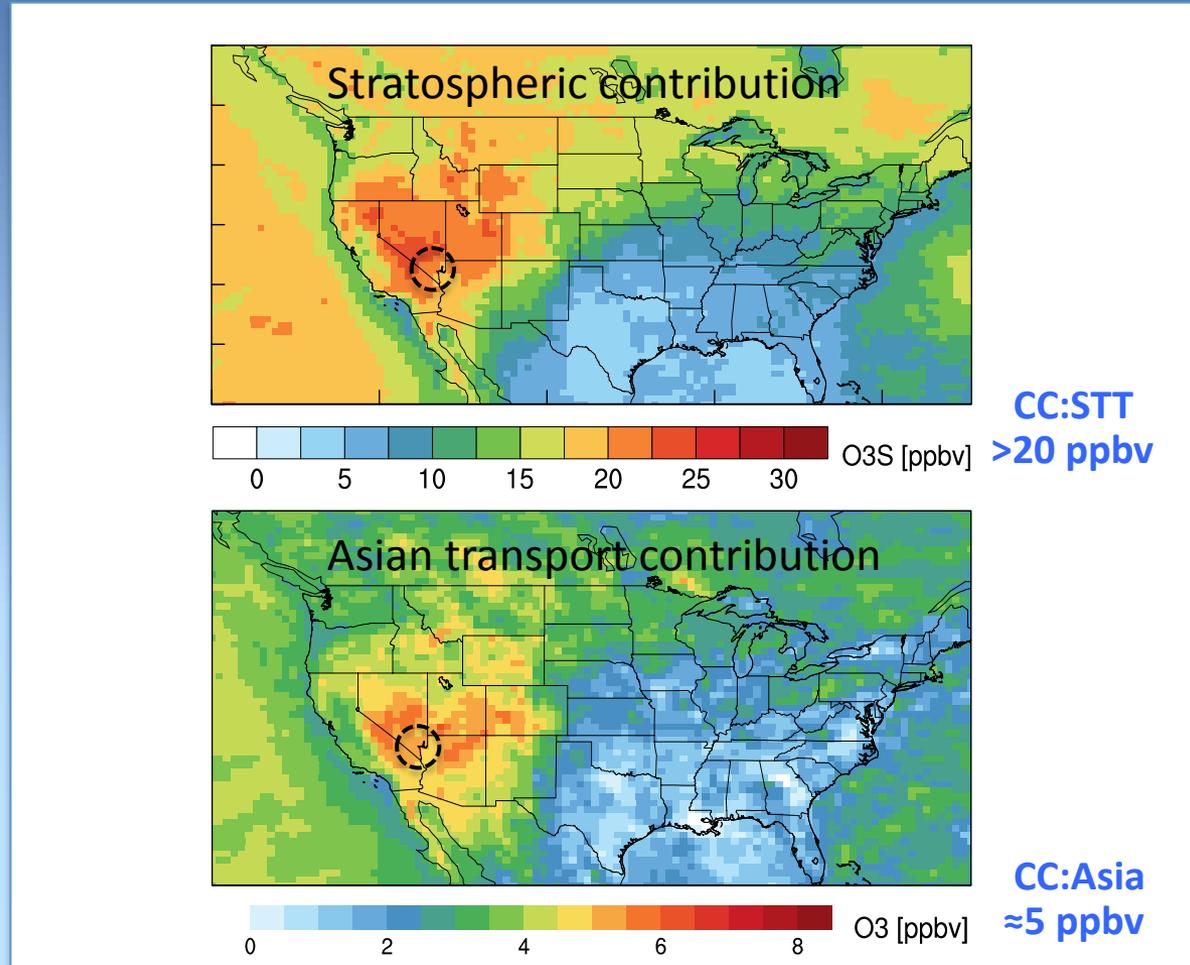
USEPA O₃ National Ambient Air Quality Standard (NAAQS)

Current (75 ppbv)

Proposed (65 ppbv)

- High springtime ozone in exceedance of current limits is not from the LA Basin
- Future limits will be below typical average values

Mean contribution to (May–June 2010) MDA8 surface O₃ from the GFDL AM3 model



Stratospheric influx is greatest in the Intermountain West

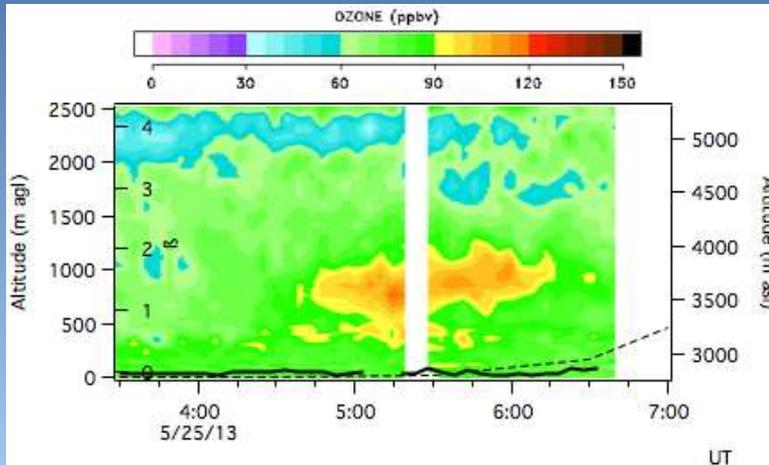
Meiyun Lin, Princeton and NOAA GFDL

TOPAZ DIAL at Angel Peak

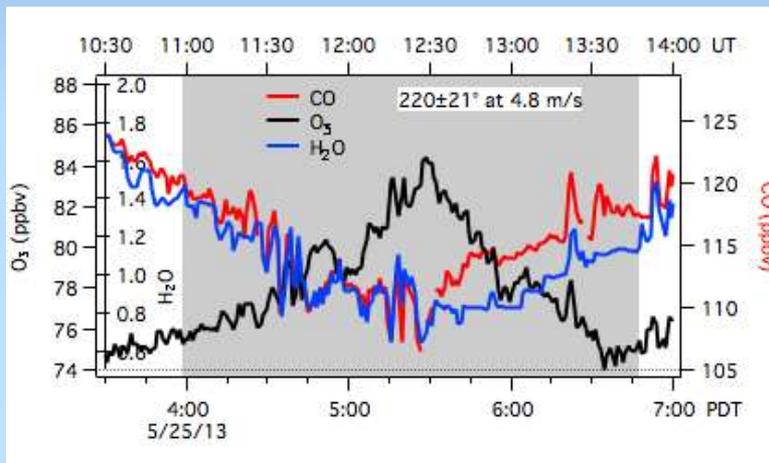
(Tunable Optical Profiler for Aerosol and Ozone)



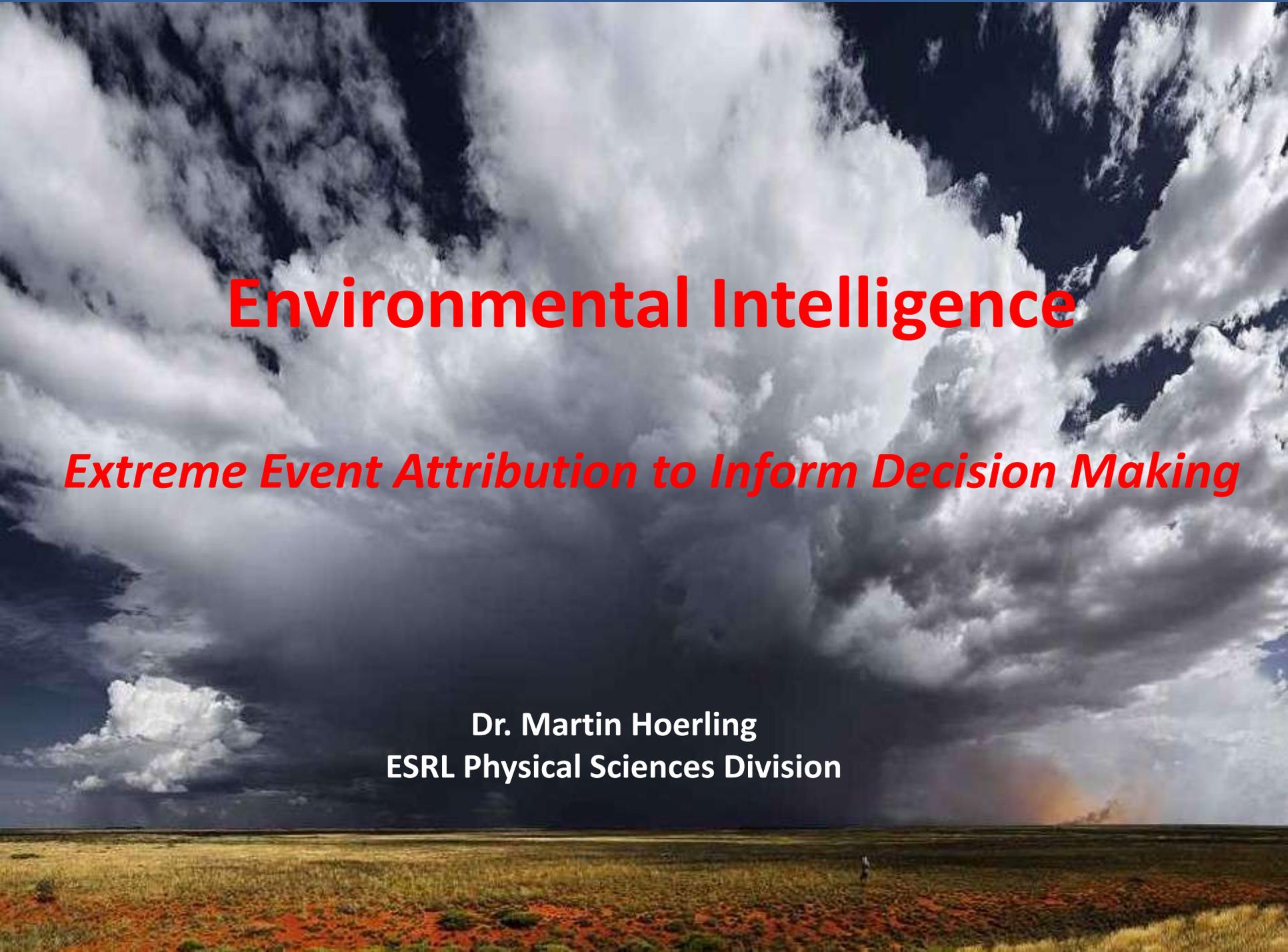
May 24-25, 2013 Stratospheric intrusion detected at Angel Peak



Elevated O_3 layer above Angel Peak at sunrise



Surface O_3 anticorrelated with CO and H_2O



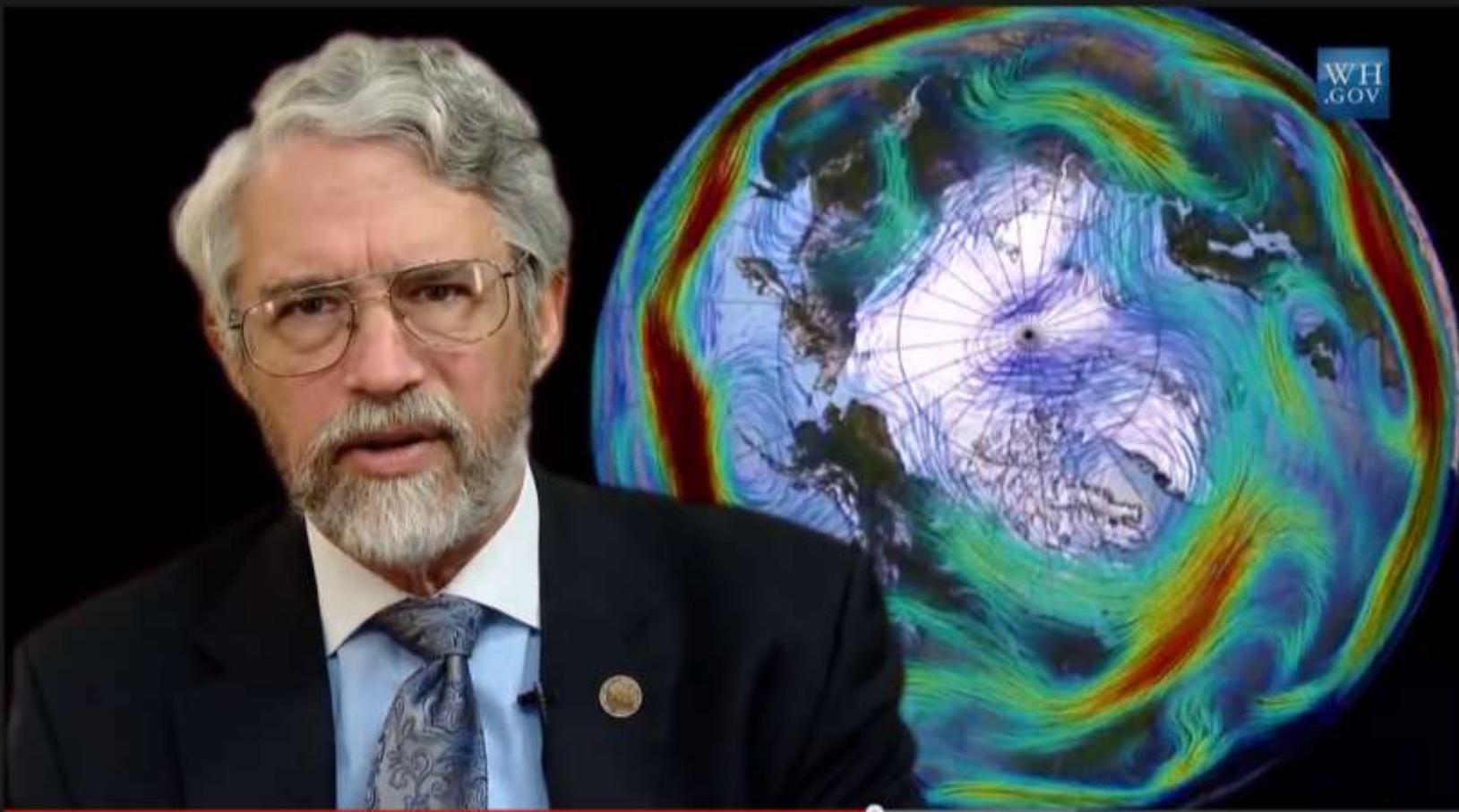
Environmental Intelligence

Extreme Event Attribution to Inform Decision Making

Dr. Martin Hoerling
ESRL Physical Sciences Division

President Obama's Science and Technology Advisor, Dr. John Holdren, explains the polar vortex — and why climate change makes extreme weather more likely (January 8, 2014)

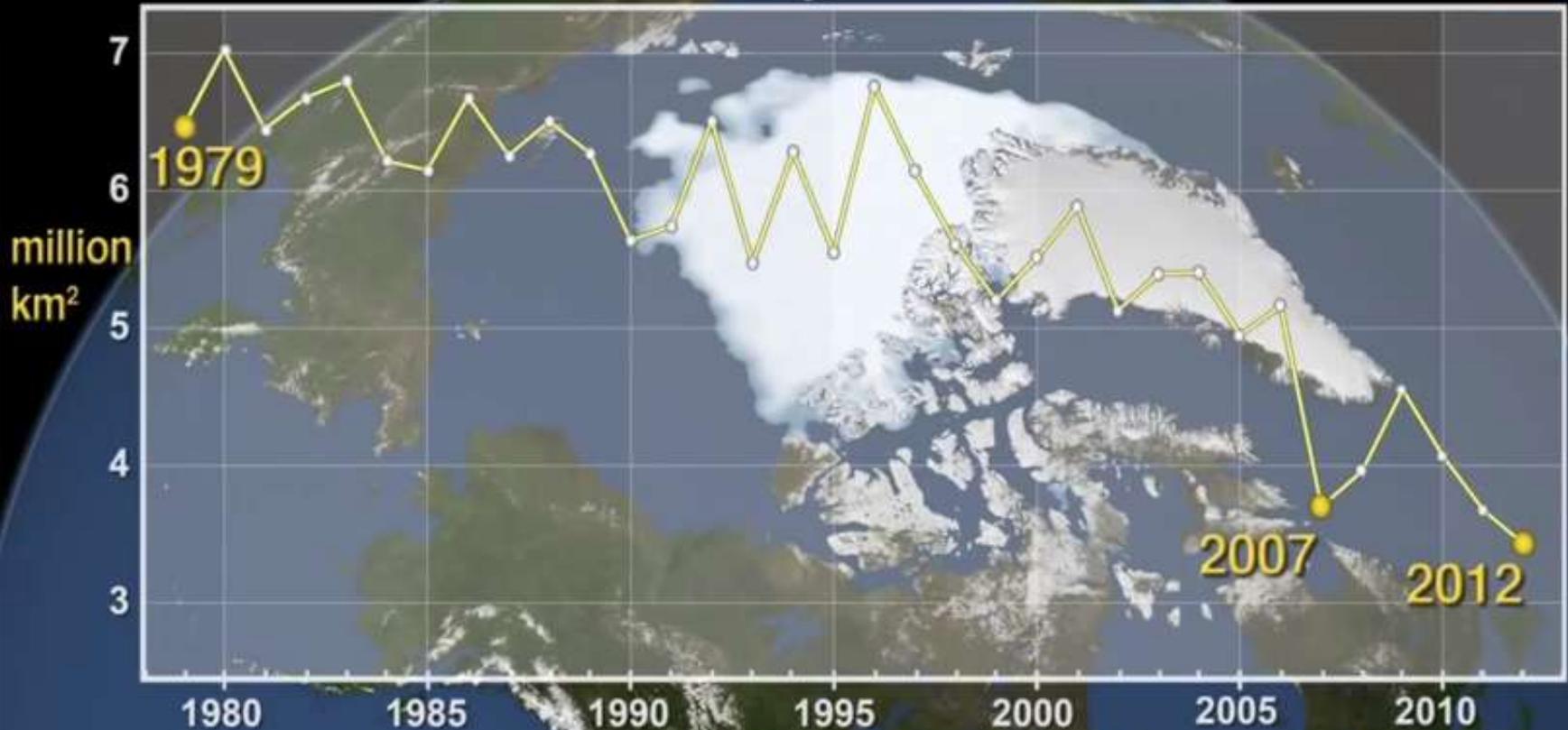
YouTube



1:10 / 2:11



Arctic Sea Ice Area



1:07 / 2:11

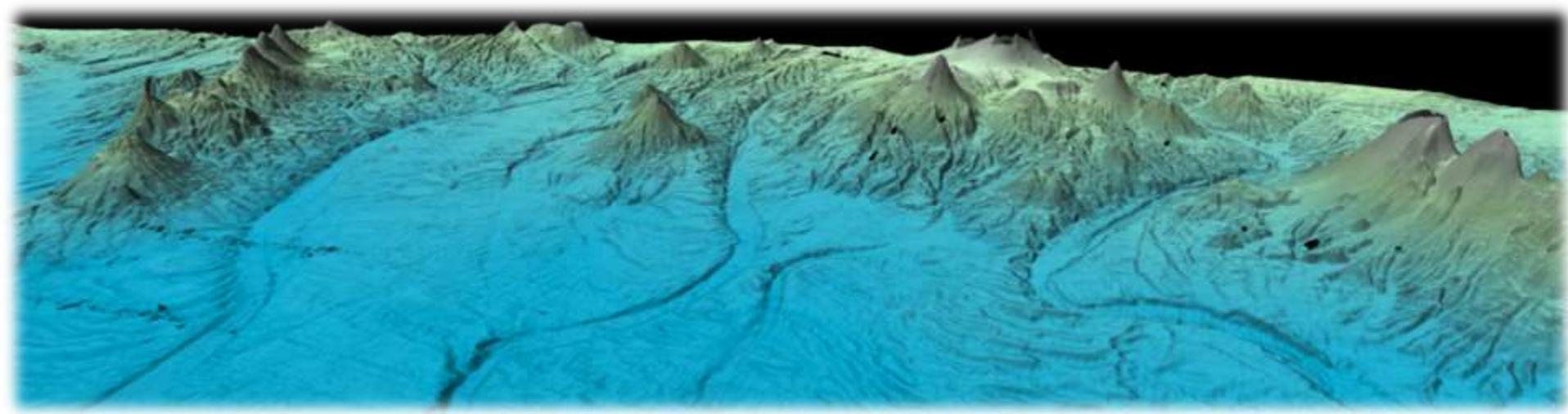


Developing Knowledge of the Earth System to Better Anticipate the Future

Science Benefiting Society: The U.S. ECS Project

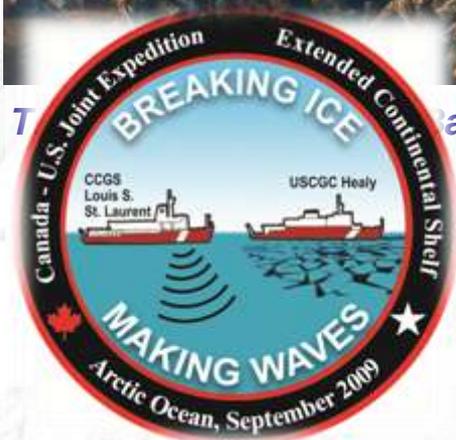
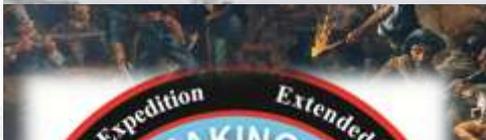


Jennifer Jencks, NOAA National Geophysical Data Center
NOAA Science Advisory Board
Boulder, CO
29 July, 2014





Extending our Territorial Limits



Seward's Folly (aka: the U.S. purchase of Alaska)

... without fighting or folly

"THE BIG THING."

Old Mother Seaman: "I'll rob some of this on his sore spot - it may soothe him a little."

© 2009 HART & VEELER

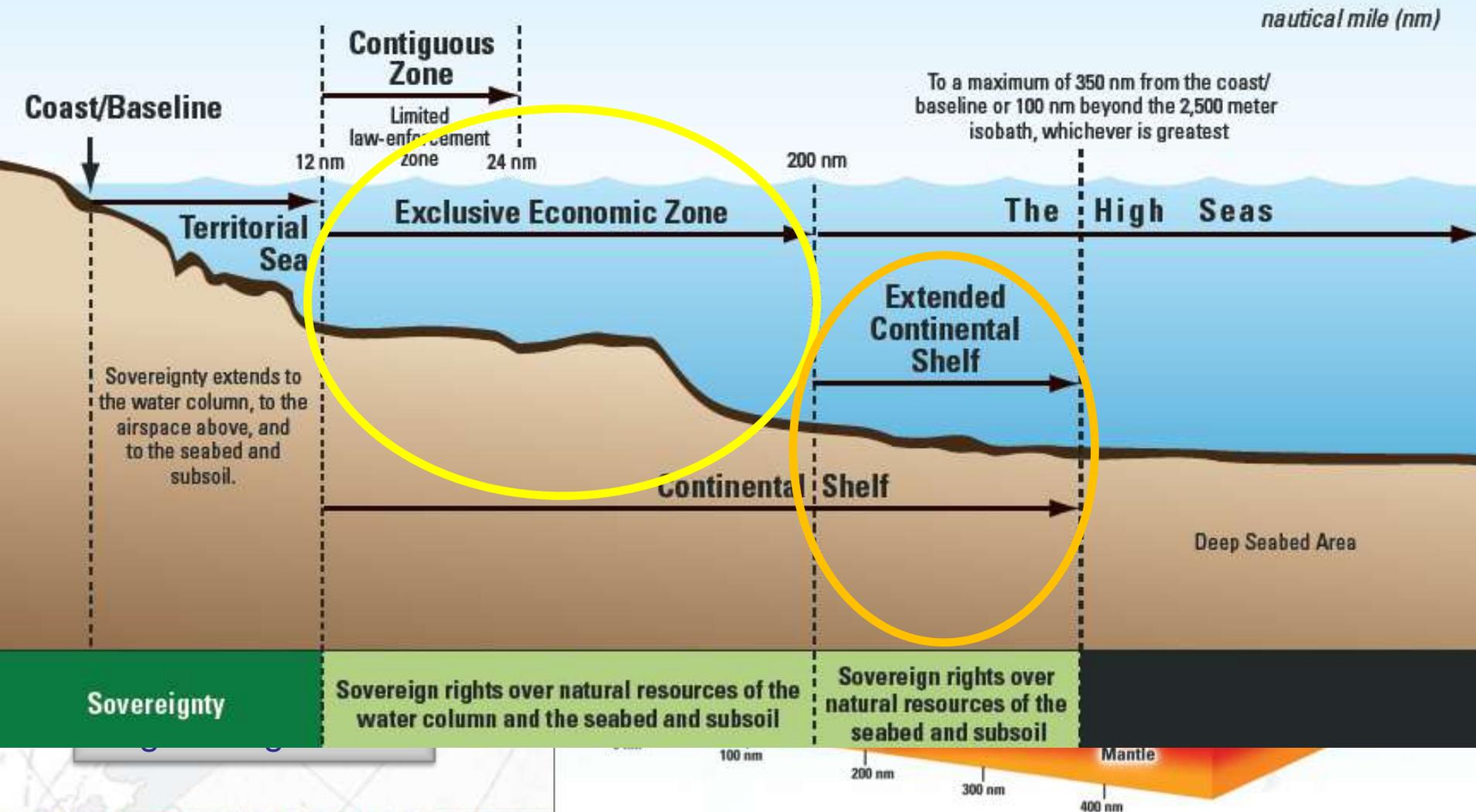


The U.N. Convention on the Law of the Sea



Extended Continental Shelf Formula Lines

Maritime Zones





The U.S. ECS – Value to Science



Computer lab aboard Ron Brown



Kilo Moana ported in Pago Pago



Washing dredge samples on the Healy

NOAA's Role

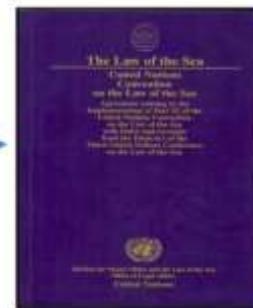
- Leads bathymetric data collection and processing
- Participates in analysis, science, and policy decisions
- Manages data and derived products



U.S. ECS Data Management



From Ship to Submission



- 31 ECS-funded Surveys collecting more than 2 million km² of data

- Arctic, Pacific, Atlantic Oceans
- Multibeam bathymetry
- Multichannel seismic
- Gravity and magnetics
- Dredges and grabs





U.S. ECS Project Office



- In early 2014, Dr. Sullivan signed an MOA with the Department of State thereby establishing the ECS Project Office in Boulder
- Led by the Department of State - NOAA and USGS primary partners
- Goal: to efficiently and effectively guide the U.S. ECS to completion

“The mission of the U.S. Extended Continental Shelf Project is to establish the full extent of the continental shelf of the United States, consistent with international law”

Space Weather Prediction Center
Services for Diverse Customer Base

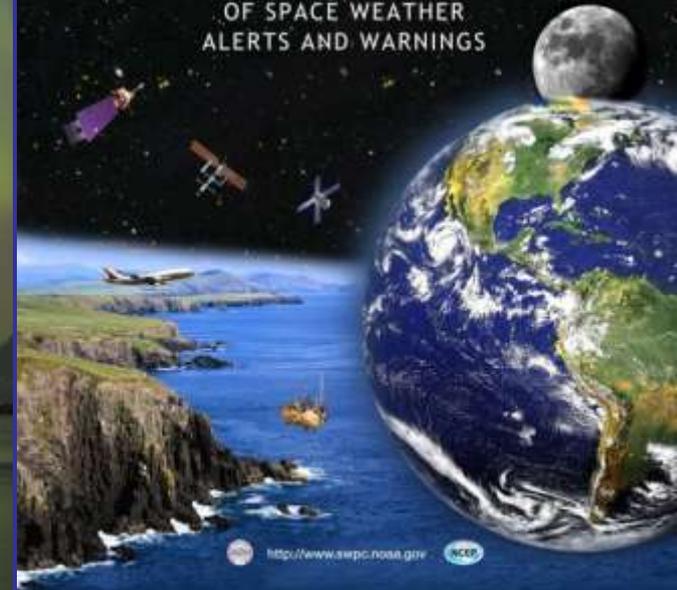
Brent Gordon – Operations Officer

29 July 2014



NOAA
National Weather Service
Space Weather Prediction Center

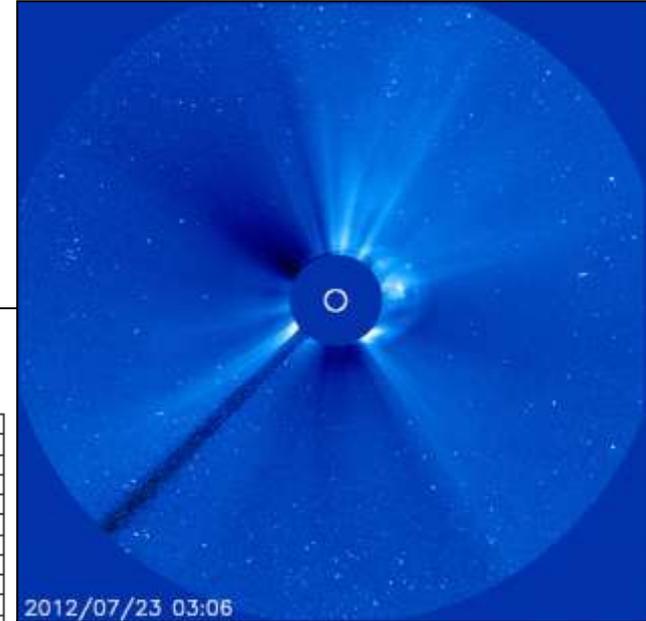
THE NATION'S
OFFICIAL SOURCE
OF SPACE WEATHER
ALERTS AND WARNINGS



NOAA Space Weather Prediction Center

Smaller solar cycle...

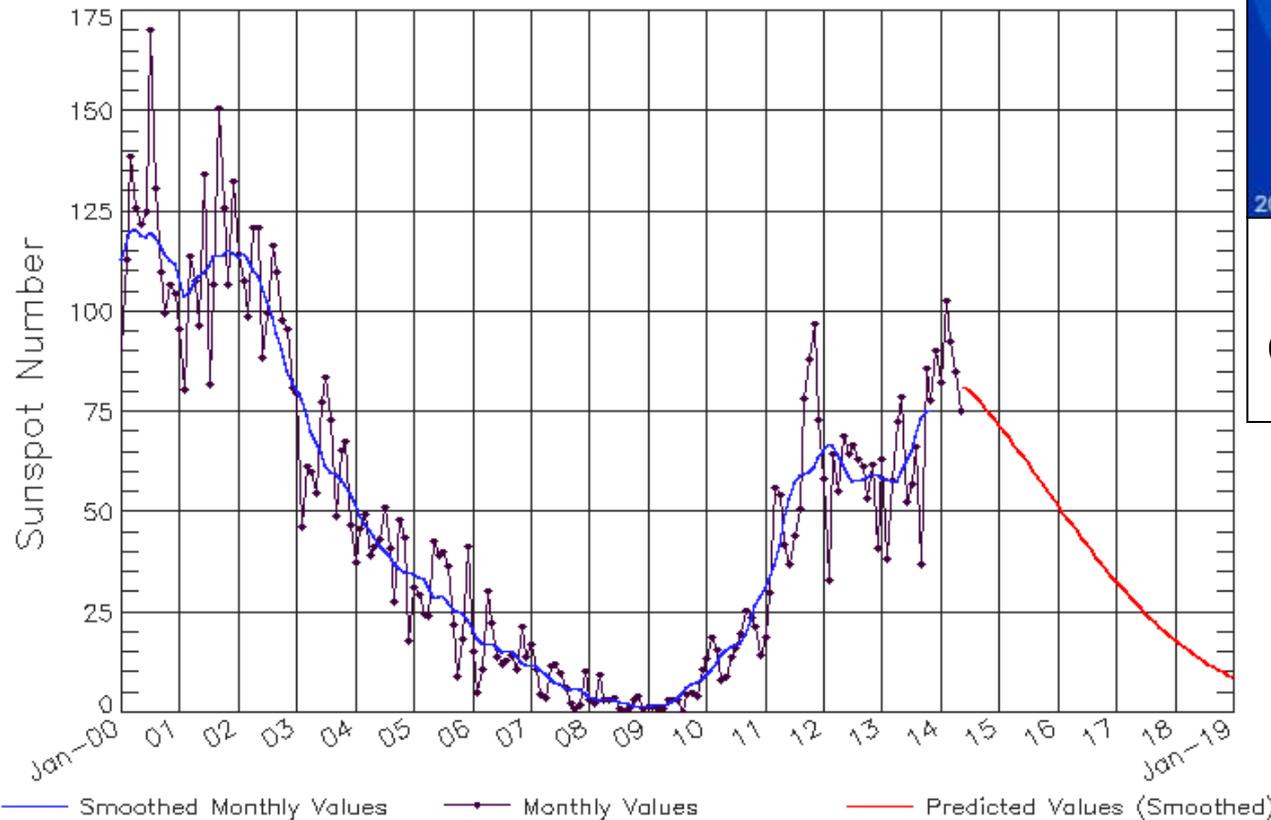
*...but big events can occur
with small cycles*



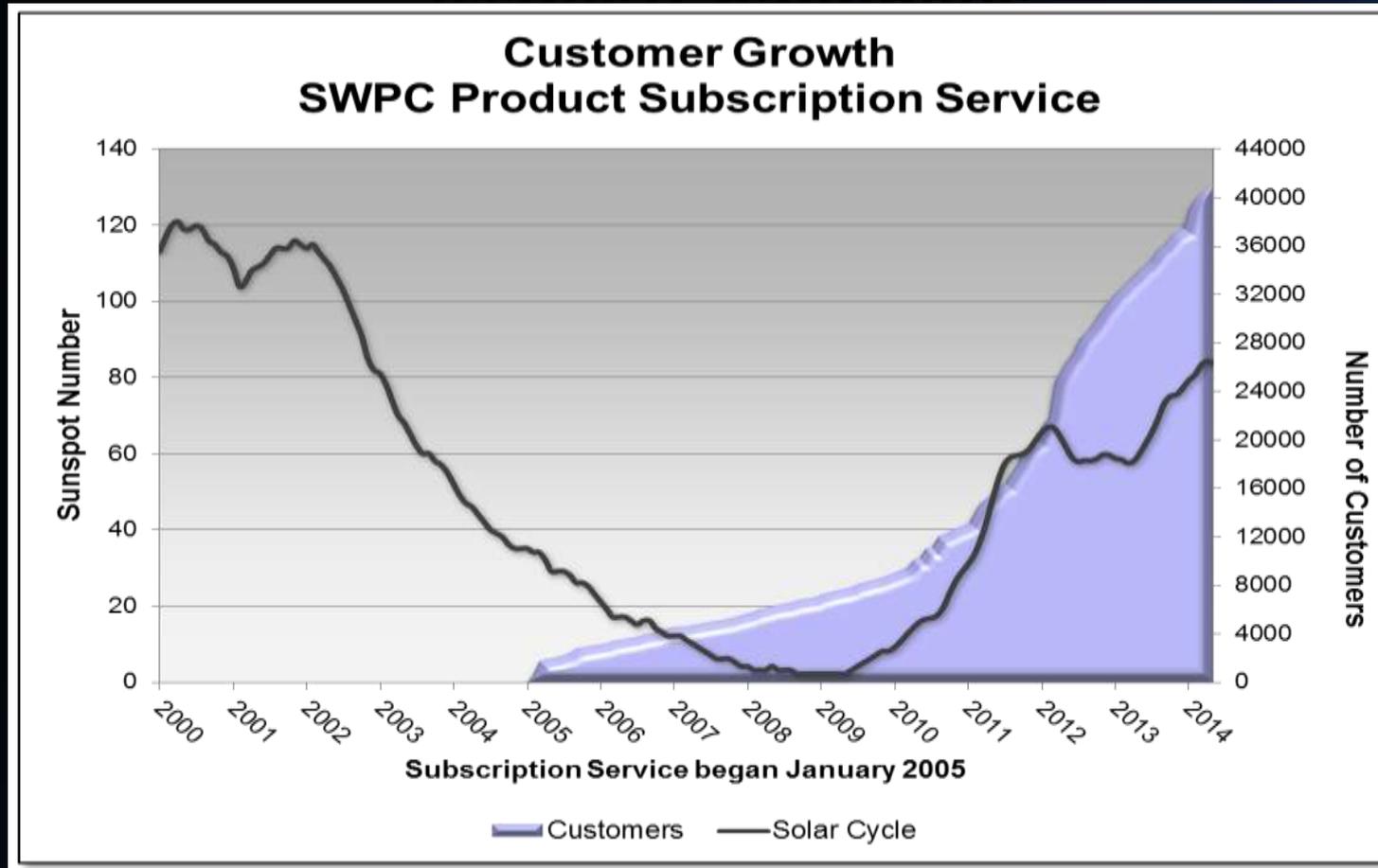
Powerful solar flare
on 23 July, 2012...

ISES Solar Cycle Sunspot Number Progression

Observed data through May 2014



The Drivers – SWPC Services driven by customer requirements



Satellite companies	Banking	FEMA	Academia	FAA
Shipping companies	Automobile industry	Communication companies	Oil drilling companies	Electric utilities
State Departments of Transportation	Precision agriculture	Major Airlines	United Launch Alliance	Surveying groups

The Response

Modeling at NOAA – A Sun to Earth Continuum

Solar /Solar Wind

Magnetosphere/
Ionosphere



Ionosphere/
Atmosphere



Earth's surface



Model combination allows for more regional focus

🔍 -0.4 ▾ +1.01x10⁻³ mBar ▾ SEALEVEL

SET NOW | 2010.10.26 13:48

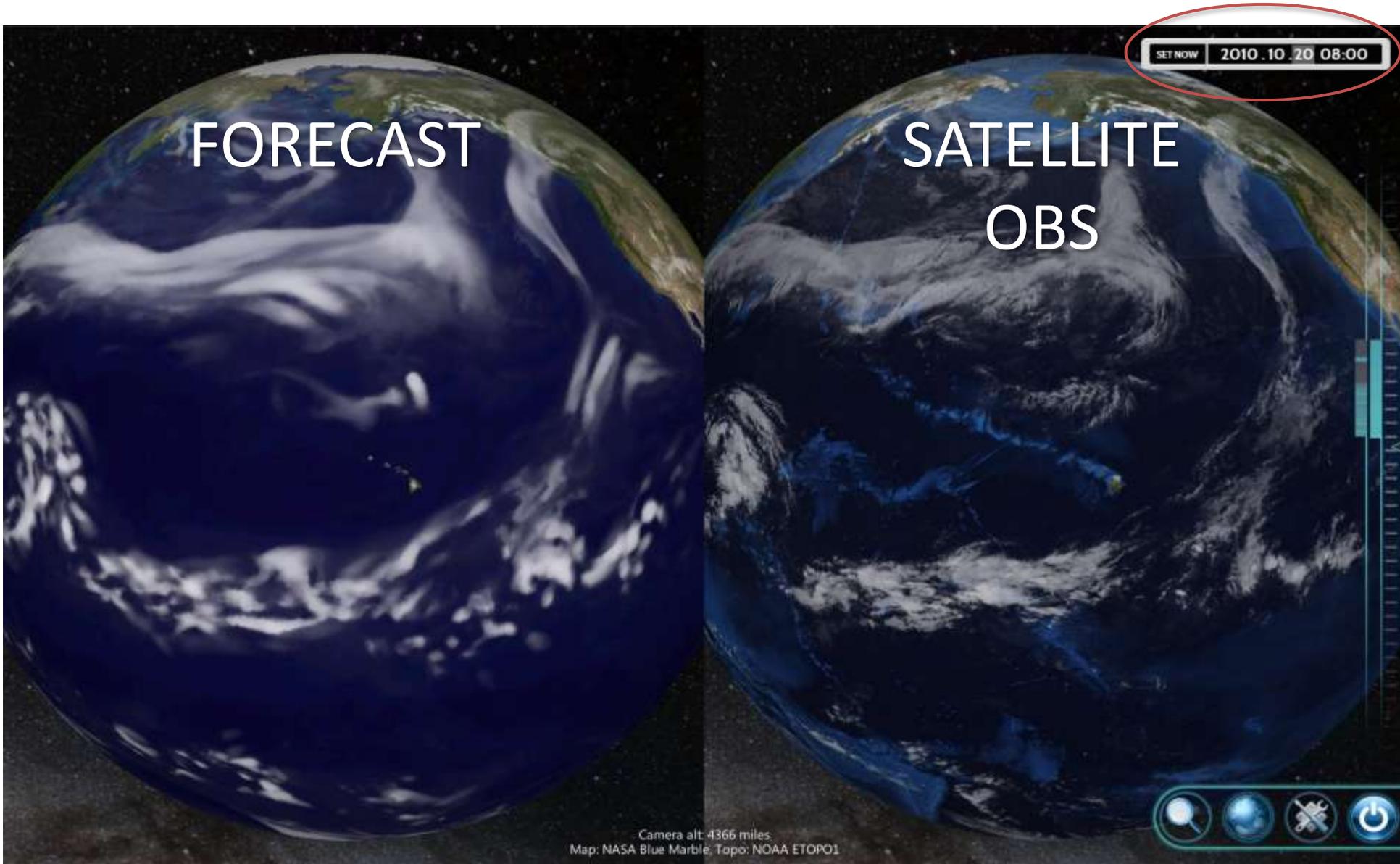
High Impact Weather Prediction Project

Tim Schneider & Jebb Stewart
ESRL Global Systems Division

Camera alt: 4366 miles
Map: NASA Blue Marble, Topo: NOAA ETOPO1



Two Early Results from HIWPP (GSD)



Questions

